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Relative Importance of Chinook Salmon Stocks to Resident Killer Whales in Northern Haida Gwaii and the Salish Sea Entrances

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Canada

Background

- Resident Killer Whale (RKW) population dynamic rates associated with coast-wide abundance of Chinook
- Northern RKW increasing & southern RKW different
- RKW foraging behavior highly specialized
  - Spatially & temporally
  - Coincide with abundance Chinook
    - Particularly in habitats where Chinook are concentrated, e.g. bottlenecks along migration routes
  - Possibly to optimize predation

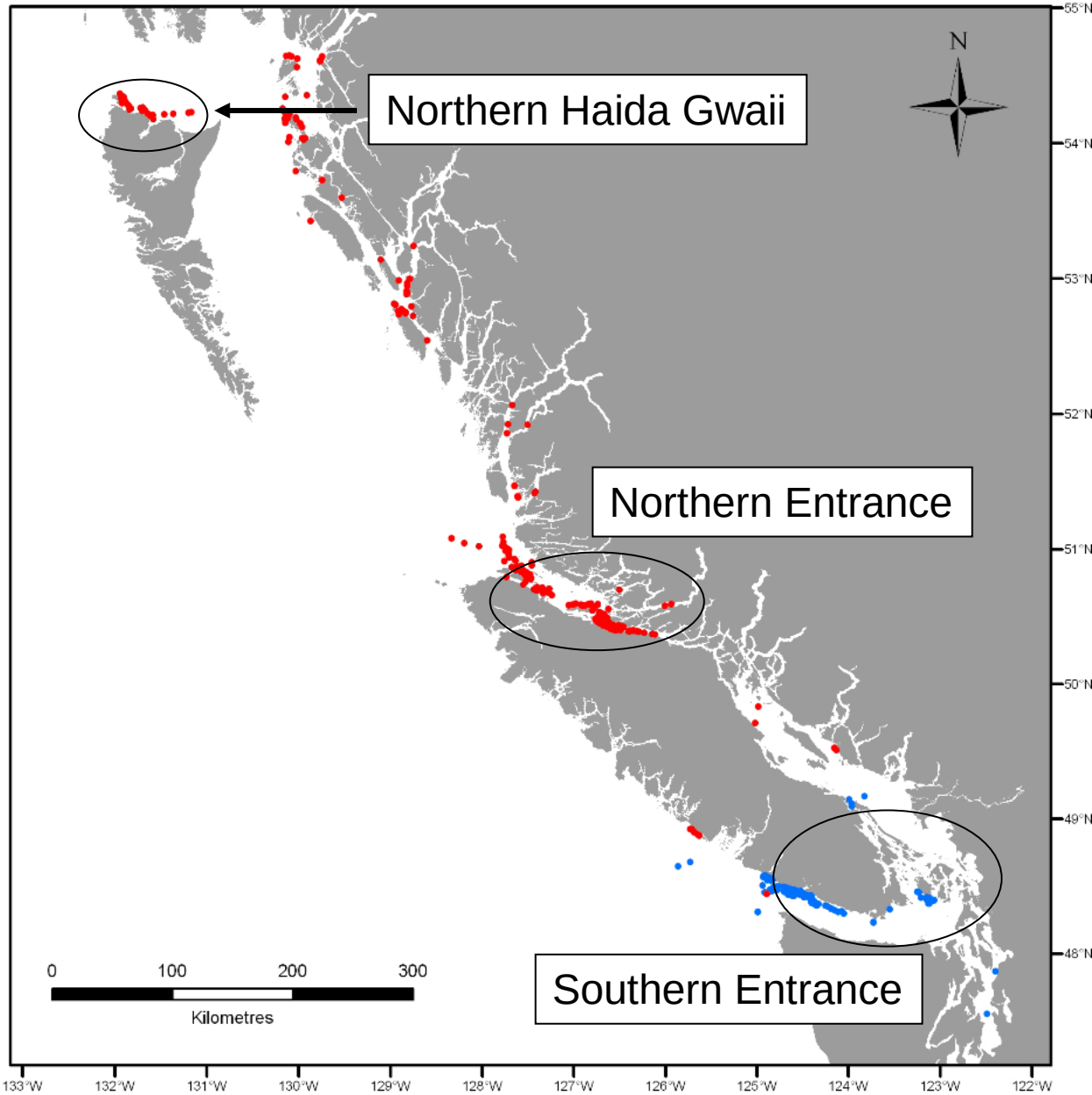
Goals

- Assess relative importance of certain Chinook stocks to RKW in 3 important feeding areas
- Compare percentages of stocks in RKW diet relative to environment
  - Are Chinook stocks eaten in proportion to their abundance?
  - Help inform further research and resource management

- RKW prey sample locations
  - Ford et al. 2009b
  - Hanson et al. 2010

San Juan Island samples not shown

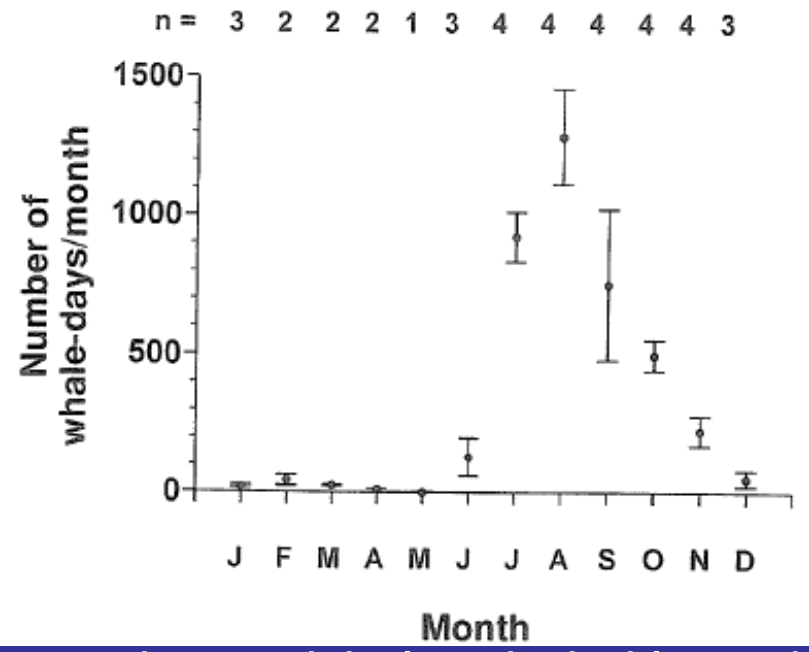
- **Northern RKW**
- **Southern RKW**

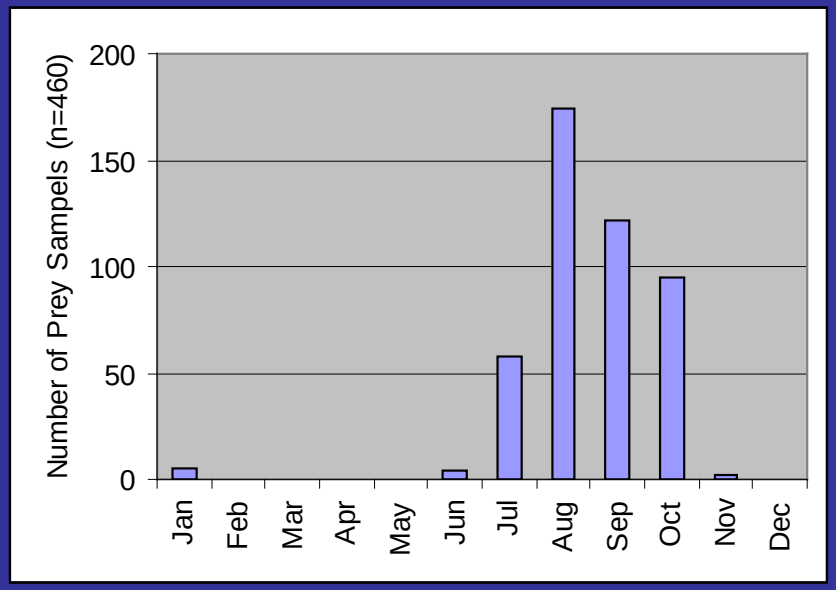


Temporal Diet Sampling: Northern Entrance

- RKW diet sampling appears similar to temporal pattern of RKW habitat use

Fig. 2. Numbers (mean ± SEM) of whale-days per month estimated from sightings and acoustic data from killer whales (*Orcinus orca*) in Johnstone Strait, B.C., between January and December of 1985–1989 (*n* is the number of replicate months).

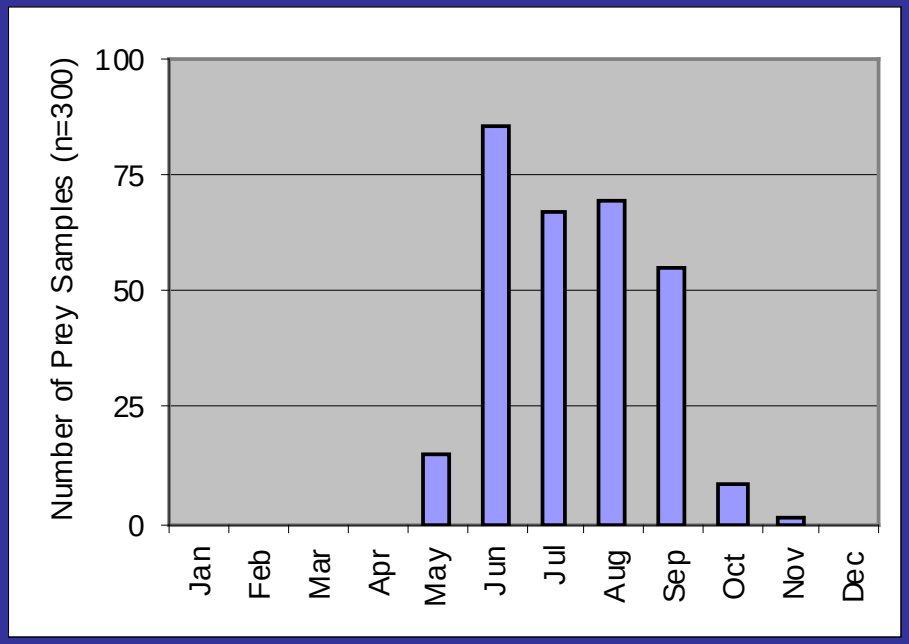




- Fig. 3. Nichol and Shakleton (1996)

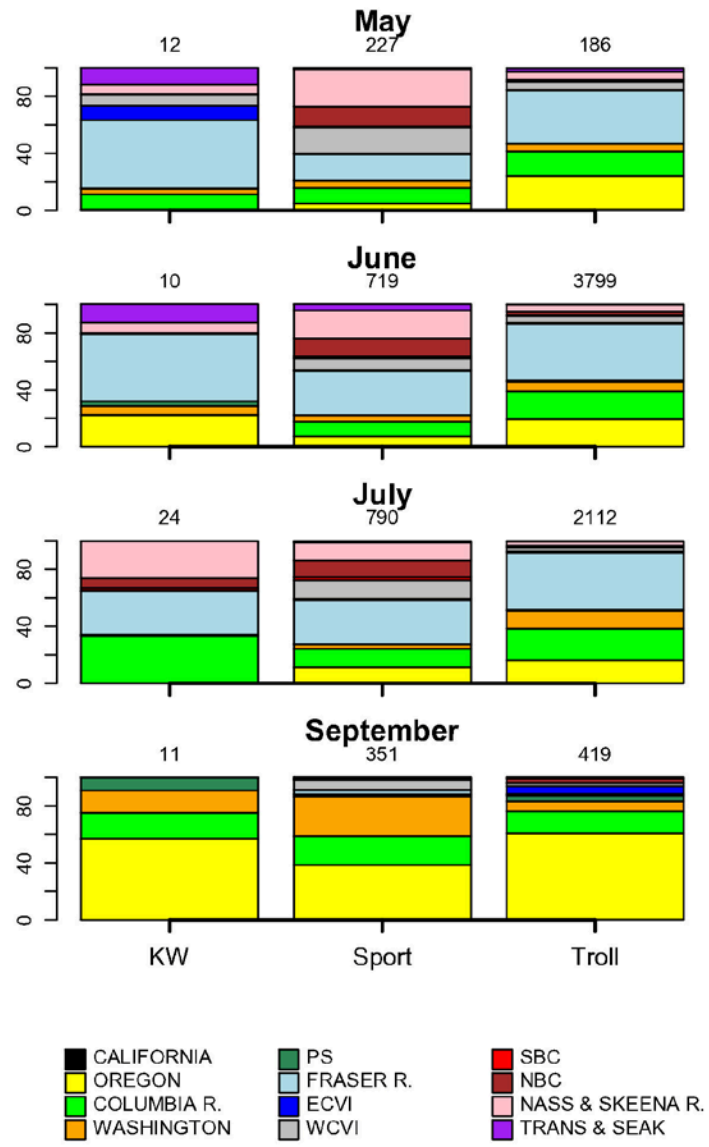
Temporal Diet Sampling: Southern Entrance

- Temporal representation of RKW diets not assessed yet
  - Combined data from Ford et al. 2009 (n=148) & Hanson et al. 2010 (n=158) for San Juan Islands (excl. fecal samples)



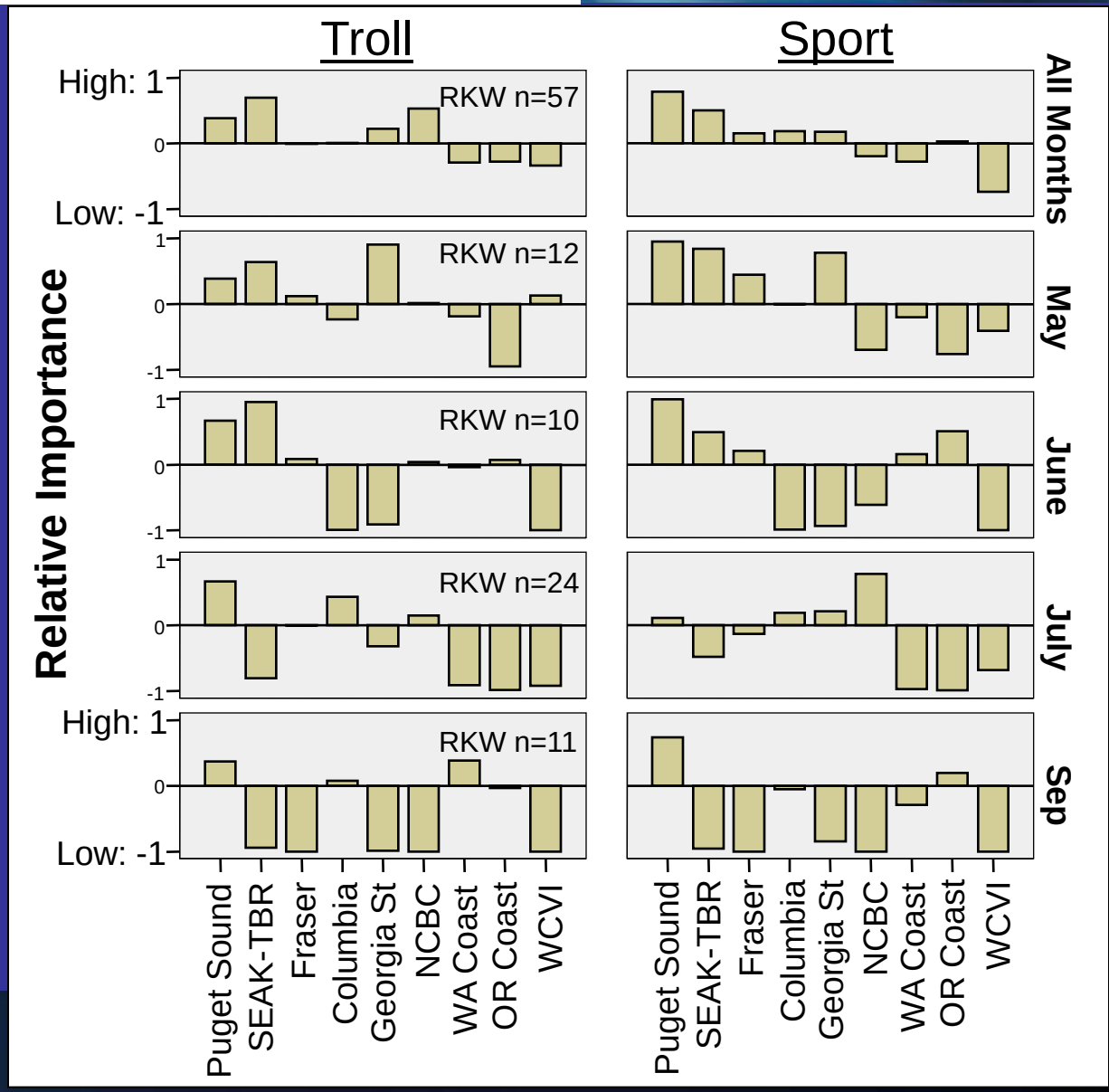
Northern Haida Gwaii

- Stock composition varies seasonally across RKW diet & fishery samples
  - Corresponds to temporal migration patterns of stocks along the coast

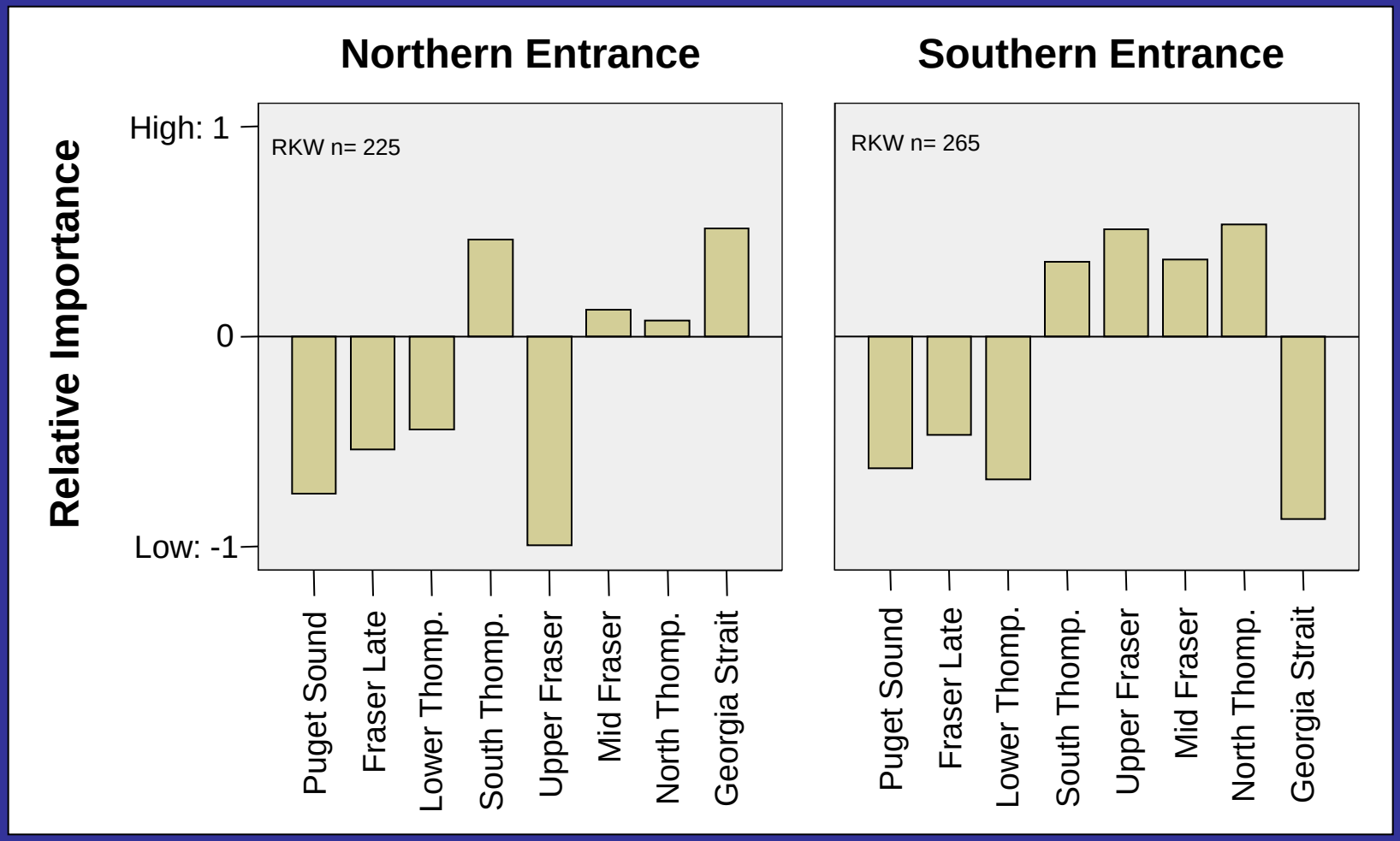


Northern Haida Gwaii

- Small RKW sample sizes by month
  - Affects high & low relative importance
- Stocks appear to be eaten in proportion to their abundance



Salish Sea Entrances



Puget Sound Stock: Low Relative Importance

- Spatial distribution of RKW in southern entrance
  - Fig 3. Hauser et al. (2007) shows low use of S. shore by RKW

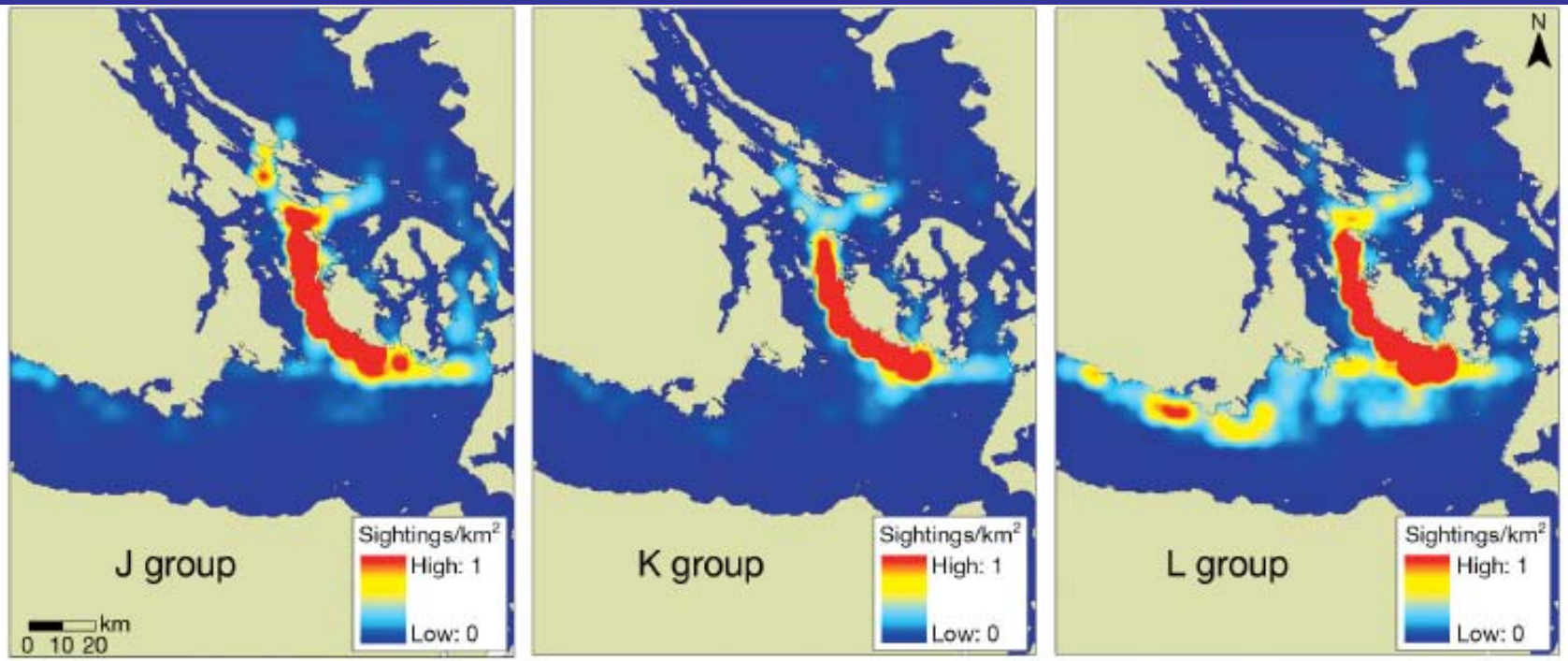
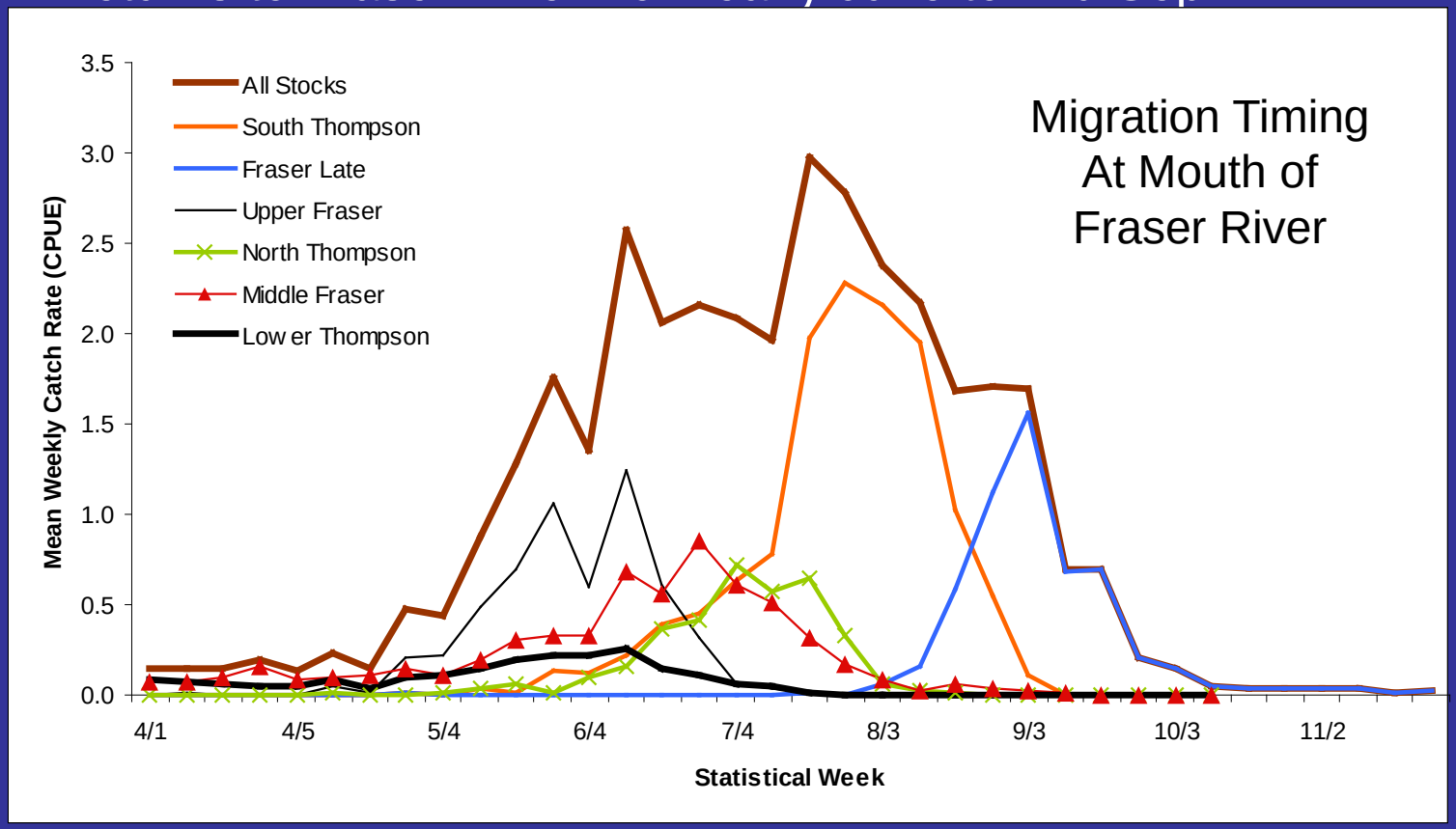


Fig. 3. *Orcinus orca*. Kernel density distributions for J, K and L groups, normalized as proportion of maximum density. Observation effort corrected using recommendations in Hauser et al. (2006)

South Thompson: High Relative Importance

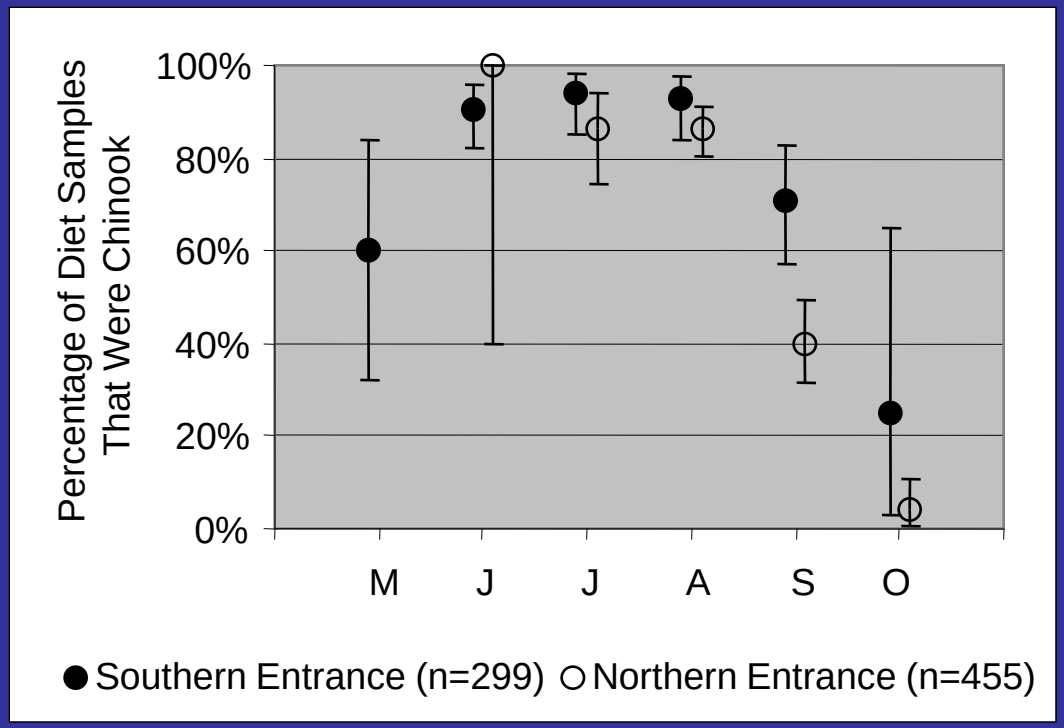
- South Thompson is large summer-run stock
  - Returns to Fraser River from early June to mid Sep.



From Parken et al. 2008 (data from 2000 and 2001 returns)

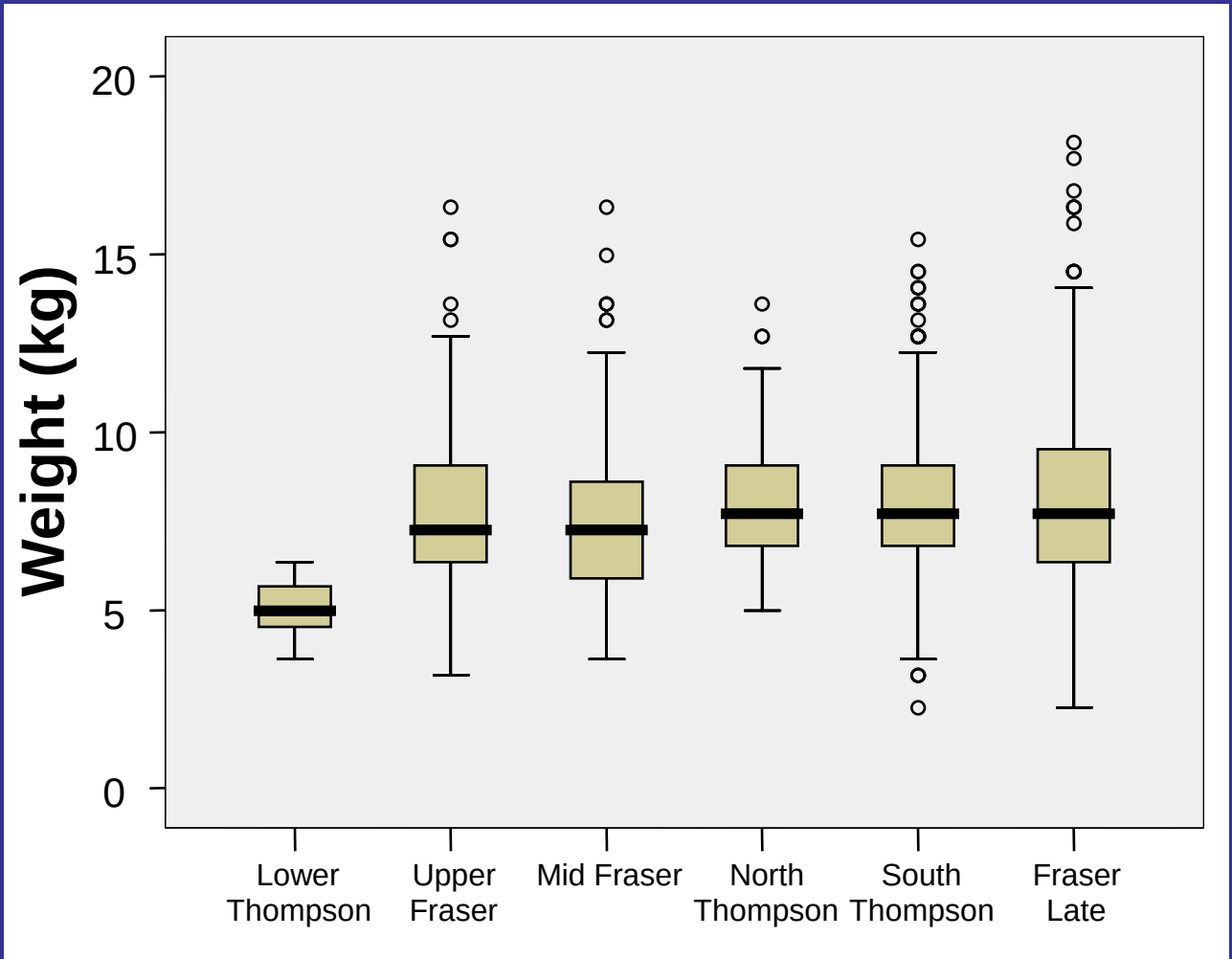
Fraser Late Stock: Low Relative Importance

- Fall-run Chinook may not be as important in Sep & Oct because RKW also eat Chum (another large salmon species)
  - Fraser Late Chinook return mainly during Sep & Oct



- Data from Ford et al. 2009 and Hanson et al. 2010

Lower Thompson: Low Relative Importance



Other Stocks

- Southern Entrance
  - Upper Fraser, Mid Fraser & North Thompson → high importance
  - Georgia Strait → low importance

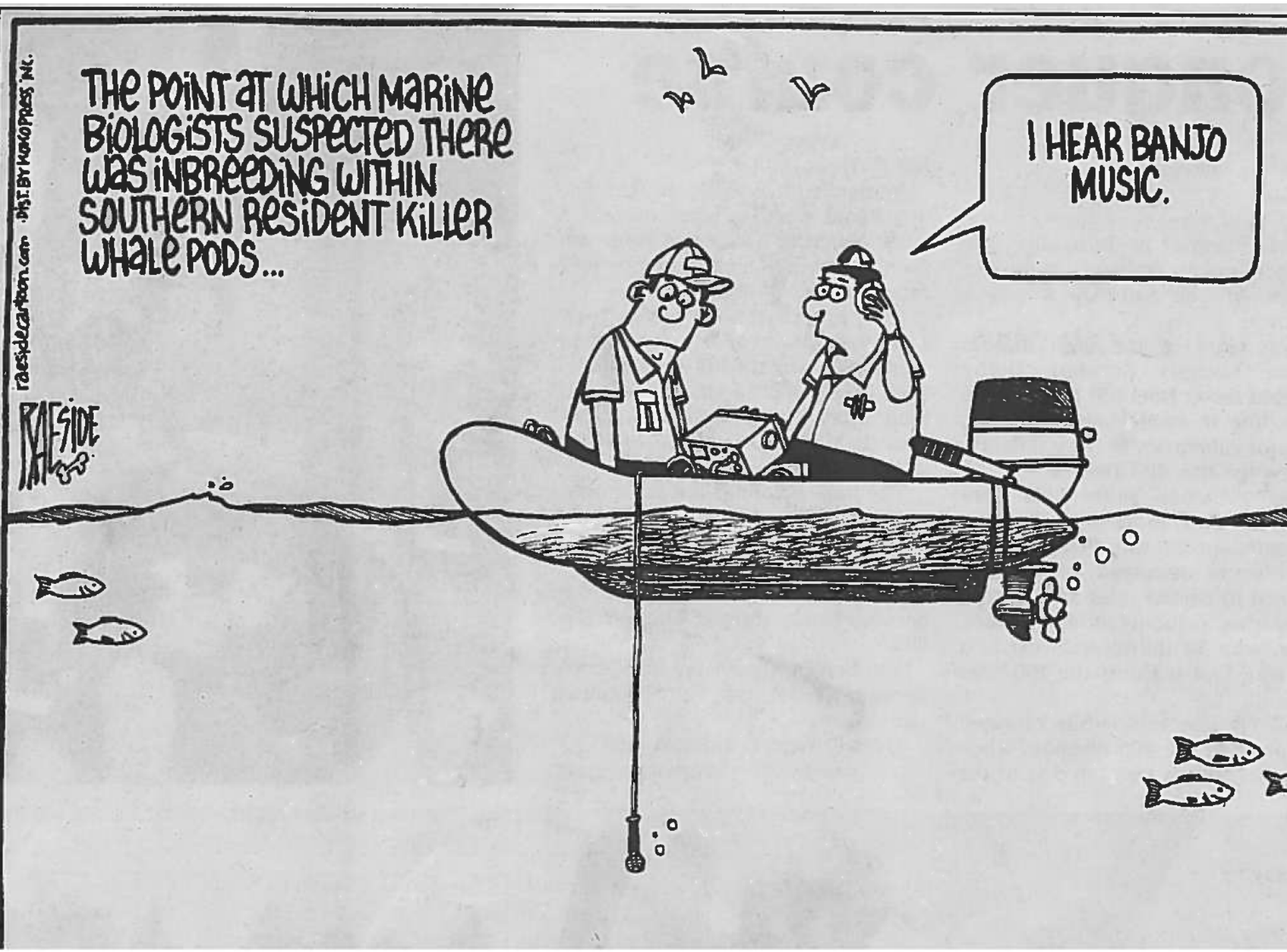
- Northern Entrance
  - Georgia Strait → high importance
    - Upper Georgia Strait far north migrating, return via northern entrance
  - Upper Fraser → low importance
    - Returns mainly during June when northern RKW feed elsewhere (e.g. Chatham Sound)

Summary

- Relative importance patterns affected by:
  - RKW specialized spatial & seasonal use of certain locations for predation
  - Size-selective predation behavior
  - Opportunities to prey on chum salmon during fall

Summary

- Haida Gwaii
  - RKW appear to feed on Chinook in proportion to their abundance
- Salish Sea Entrances
  - 2 most abundant stocks eaten less frequently than expected
  - South Thompson had high importance in both entrances
  - Other Fraser spring- & summer-runs had high importance in southern entrance only
  - Georgia Strait had high importance in northern entrance only


THE POINT AT WHICH MARINE BIOLOGISTS SUSPECTED THERE WAS INBREEDING WITHIN SOUTHERN RESIDENT KILLER WHALE PODS...
I HEAR BANJO MUSIC.
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